Title of Invention

An internal structural lintel is for supporting unit masonry above an opening in a wall. The structural components of the internal lintel are completely covered by brick or mortar in the completed work.

Background

Field of Invention

This invention relates to building construction, specifically to a support for masonry units over a wall opening.

Background

Discussion of Prior Art

An opening in a masonry wall can be effected by forming a natural arch whereby gravity forces on the masonry are directed to the ends of the arch through compression of the masonry units and the mortar. A semi-circular arch is a very efficient shape for transferring the vertical forces to the ends of the opening.

Gravity forces can be transferred to major structural elements of the building (e.g. beams and columns) using steel rods and shapes attached with mechanical or welded connections to the structural elements. The masonry units rest on a steel shelf that is attached to the steel rod or shape. A steel angle is a very common shelf for masonry that can be connected to beams, anchored to concrete floor slab, or merely rested on masonry jambs at each side of the opening.

Another means of supporting brick masonry over an opening is resting it on reinforced concrete that has been prepared to either complement the masonry or mimic it with coloring and surfacing.

Yet another means of supporting masonry is with internal structural members fully contained within the wall and having some form of hanger element that relies on the mortar in some way to help carry the bricks. Examples of this can be seen in patent numbers 1412477, 2325614, and 2361828, and also in the Concealed Lintel manufactured by the Halfen division of Meadow Burke Products headquartered in Tampa Florida.

Objects and Advantages

A true arch is very simple and efficient but is limited in proportions. It may be desired to achieve an aesthetic different from a semi-circular head. It is possible to construct an arch with a dimension from the spring line to the apex less than half its width, however the lower the ratio of these dimensions, the greater the amount of side thrust exerted by the arch. The magnitude of the thrust can become prohibitively large, especially if the thrust is directed against a column or pier of limited width. Another condition of concern is a wide jamb (deep pocket in a wall). In this case much of the arch bears on and thrusts against a veneer of masonry whose plane is perpendicular to the thrust force and therefore cannot offer substantial resistance.

Systems that utilize steel allow much more freedom of design. The problem with typical shelf lintels is exposure. It is frequently undesirable to have steel elements exposed to view. There is also the issue of protection from the elements and continued maintenance of that protection. Most typically this protection is in the form of paint, which must be reapplied every few years. This invention can be galvanized and is protected from the elements by the masonry veneer. Its life expectancy is as long as that of the building without additional maintenance.

Reinforced concrete lintels are heavy in comparison with other common methods. This can be a significant disadvantage during construction because a crane is required for a trade that normally would not need one. Excessive weight can also exceed structural limits of bearing pressure on the masonry at the jambs of the opening, where this type of lintel is usually supported. Finally, this method like others can be limiting for a designer.

This invention is much lighter and typically can be set without a crane. The lower weight also reduces pressure at the bearings. The visible product is masonry installed by a craftsman, rather than a facsimile.

Other internal lintels offer significant freedom for a design professional, but still have limitations. All the listed examples of internal lintels place their strength elements within the joints between courses of masonry, either oriented horizontally or vertically. This limits the bond pattern achievable with the lintel. This also places a practical limit on the strength of the main element and a corresponding limit on the width of an opening. This invention places the support beam above and behind the masonry units so it can have a larger cross-section and greater strength. Added cross section is particularly important where seismic motion is a concern and forces can be in any direction. The previously listed lintels have minimal strength perpendicular to the major plane of the beam. The final advantage of this invention over previous patents is the mechanical connection between the masonry units and the support beam giving superior resistance to wind or earthquake loads.